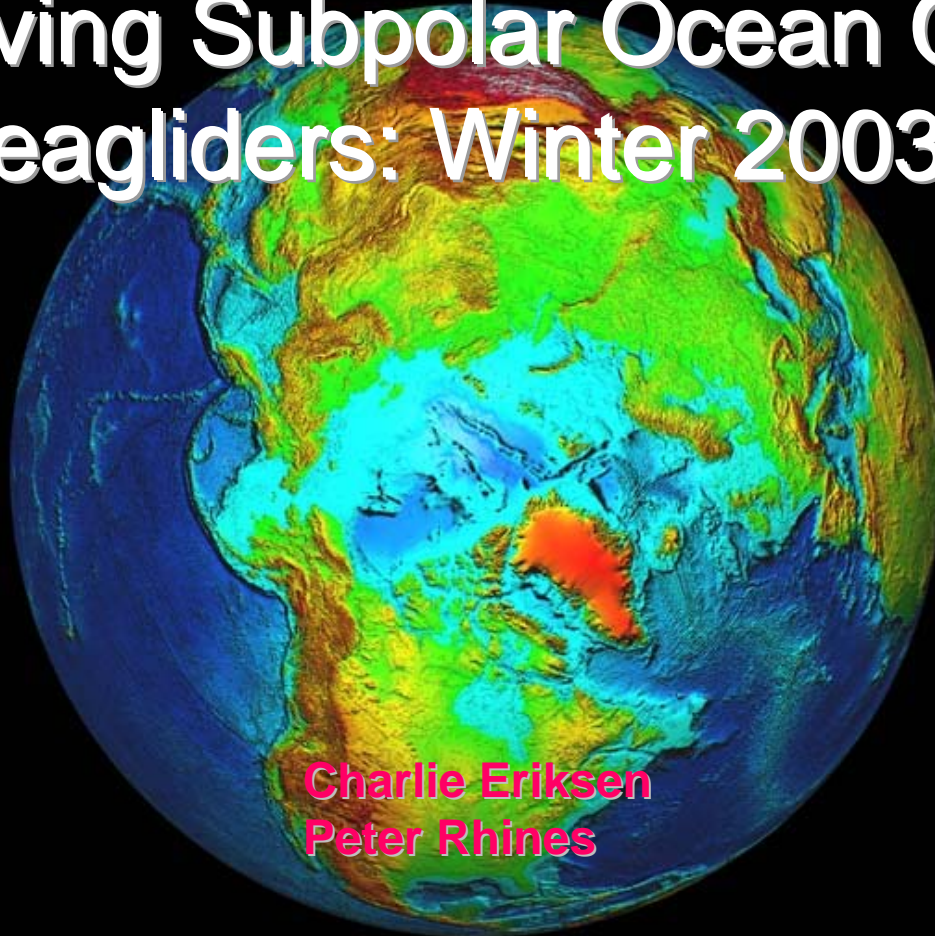


Observing Subpolar Ocean Climate with Seagliders: Winter 2003-2004



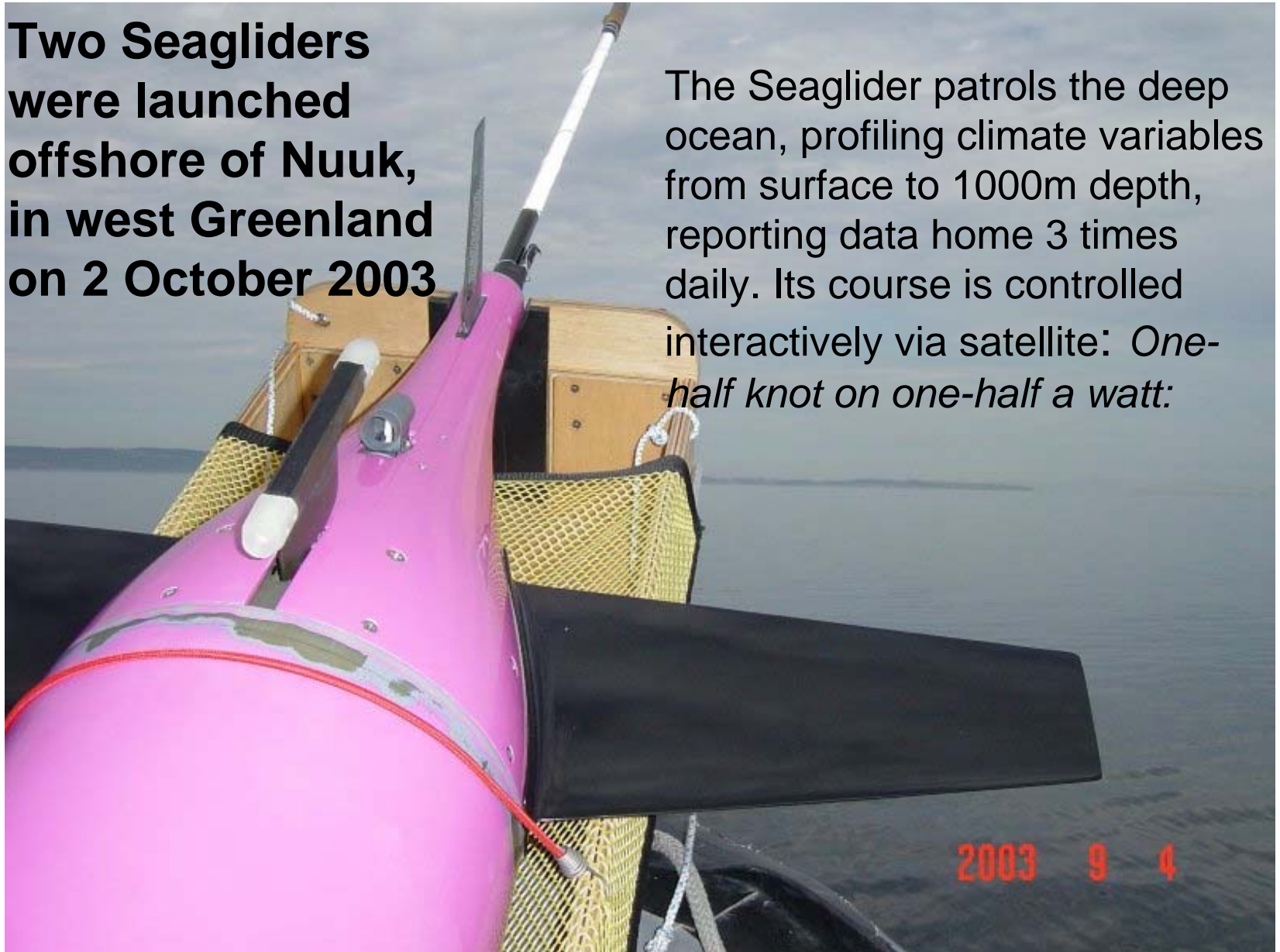
Charlie Eriksen
Peter Rhines



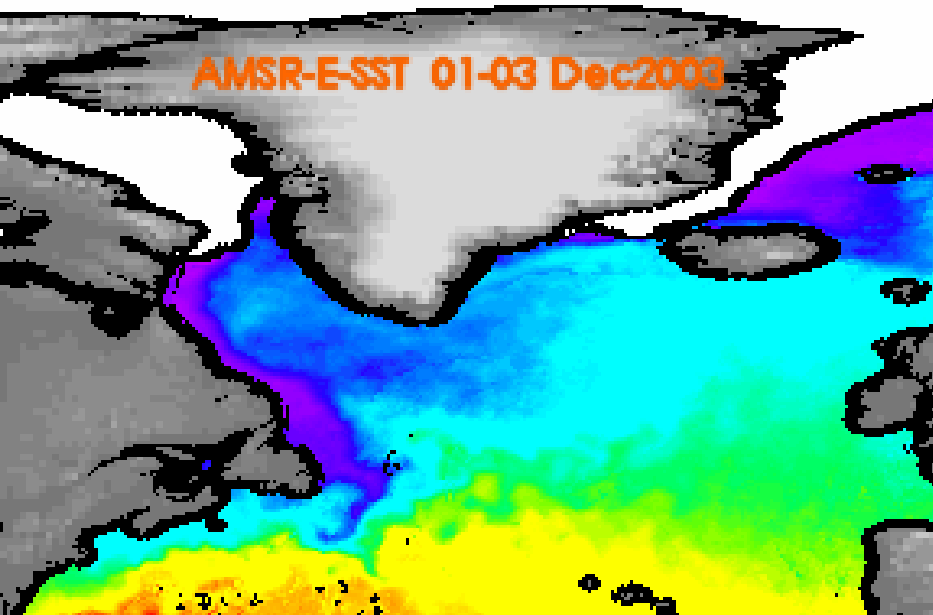
University of Washington

**Two Seagliders
were launched
offshore of Nuuk,
in west Greenland
on 2 October 2003**

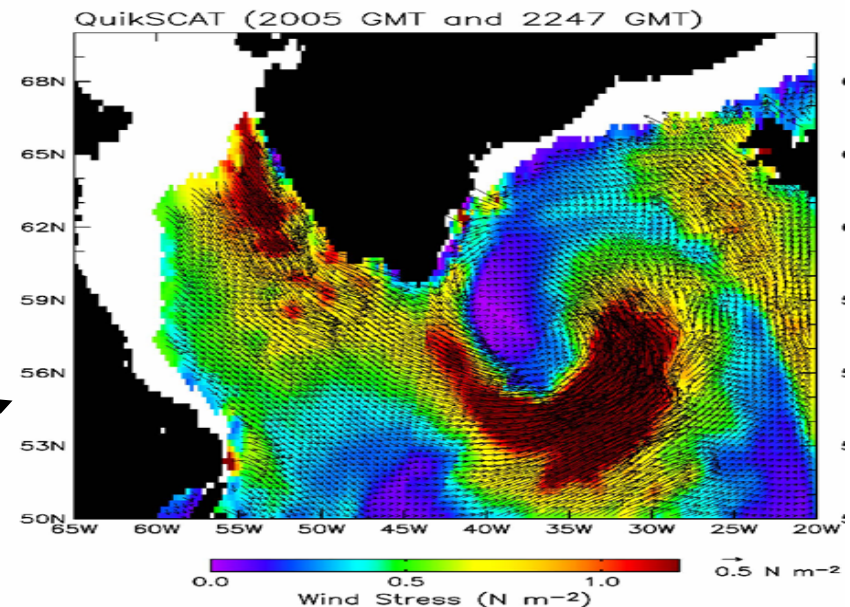
The Seaglider patrols the deep ocean, profiling climate variables from surface to 1000m depth, reporting data home 3 times daily. Its course is controlled interactively via satellite: *One-half knot on one-half a watt:*



Cold, low salinity waters issue from the Arctic into the Atlantic both east and west of Greenland. This AMSR satellite view of sea-surface temperature shows these currents winding southward round the Labrador Sea

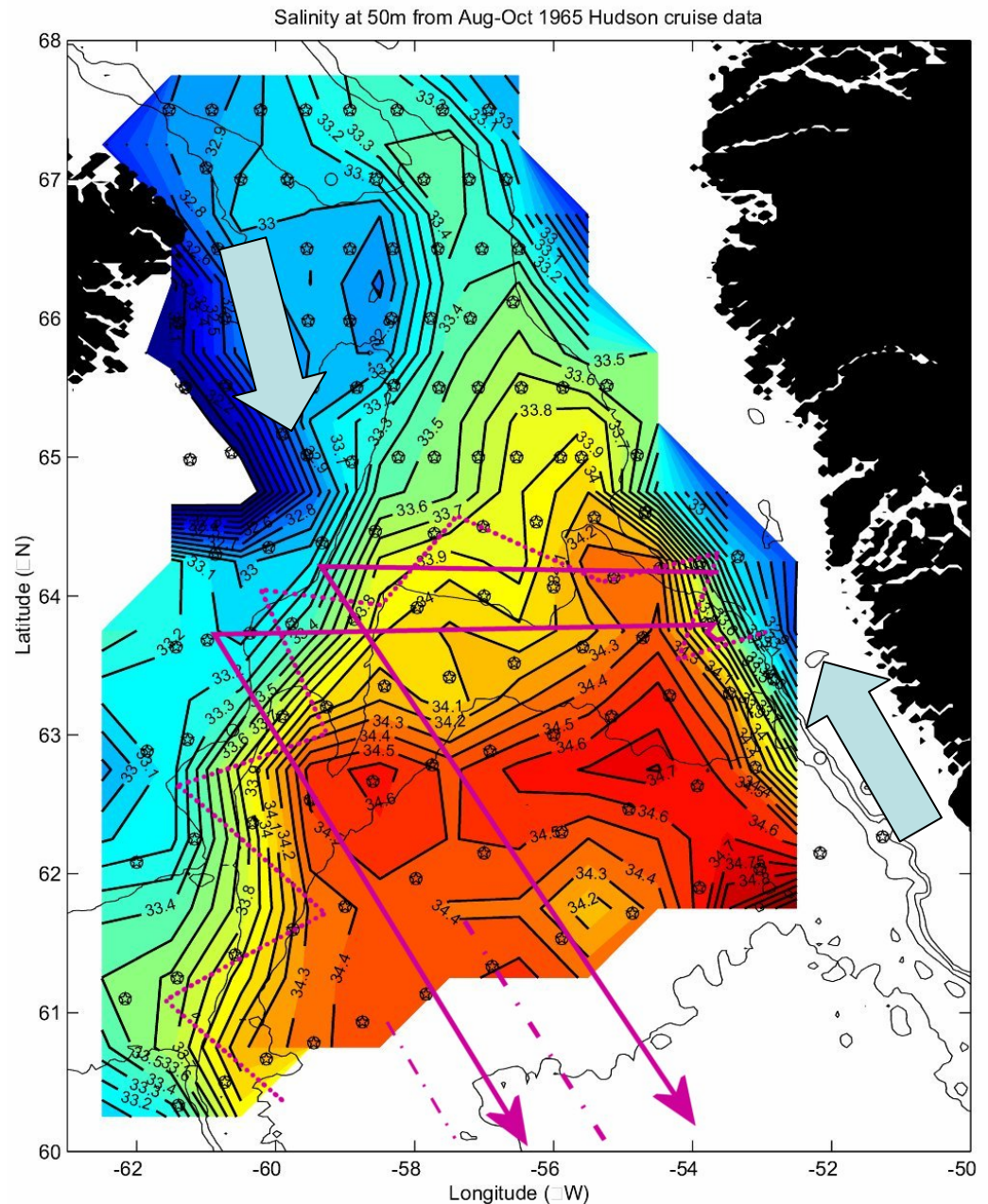


The ocean responds directly to atmospheric forcing by the Icelandic Low/Atlantic storm track...and perhaps feeds back upon it (*QuikSCAT windstress for 12 Jan 2001 analyzed by Dudley Chelton*)

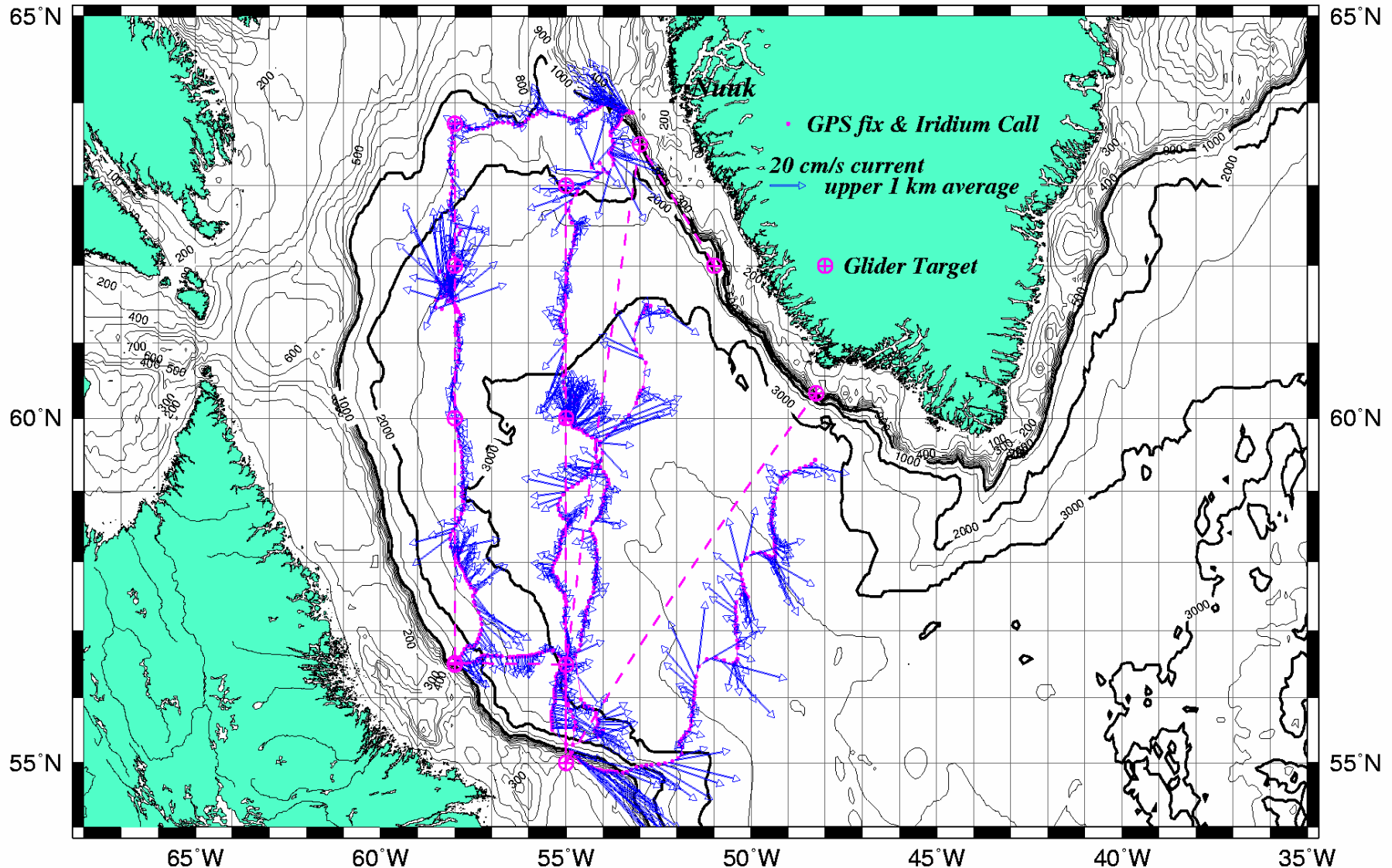


- The Seaglider mission is to track the location and movement of low-salinity water masses, which pass into the Labrador Sea from the Arctic, via Baffin Bay. Other sources of fresh-water are local runoff, Hudson Strait outflow, and the East Greenland Current which flows on the shallow continental shelf from the Denmark Strait/Fram Strait region. This figure shows the salinity at 50m depth during the one (*and only*) 3-dimensional survey ever carried out previous to this winter (in 1965-66)

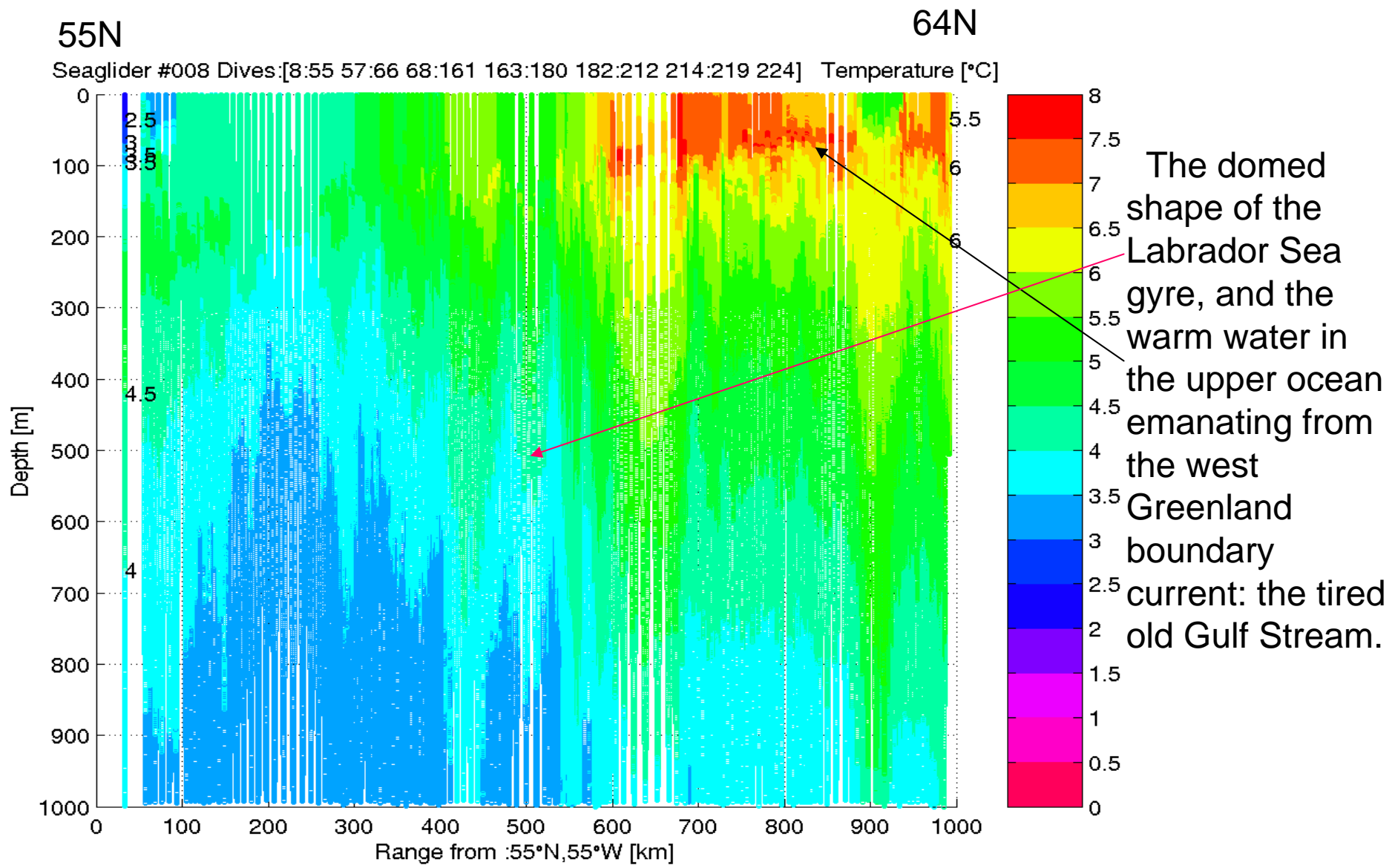
data from John Lazier, Bedford Inst. of Oceanography
plot by J. Cuny, P. Rhines, Univ. of Washington



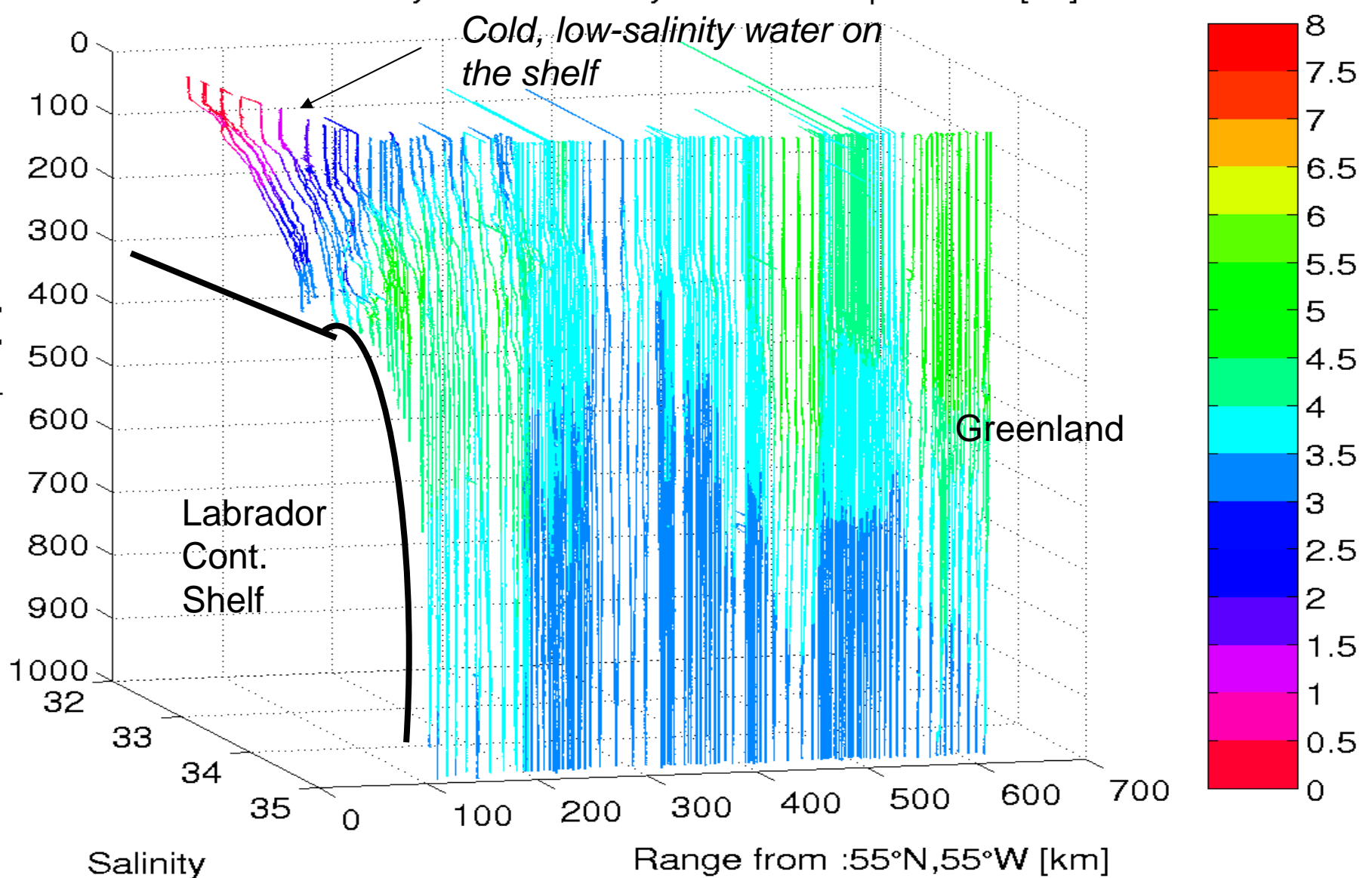
Tracks of Seagliders 004 and 008, winter 2003/4,
totalled about 5000km. Arrows show average current in top
1000m of the Labrador Sea. Combined with temperature and salinity
profiles this gives estimates of the total velocity profile over this range.



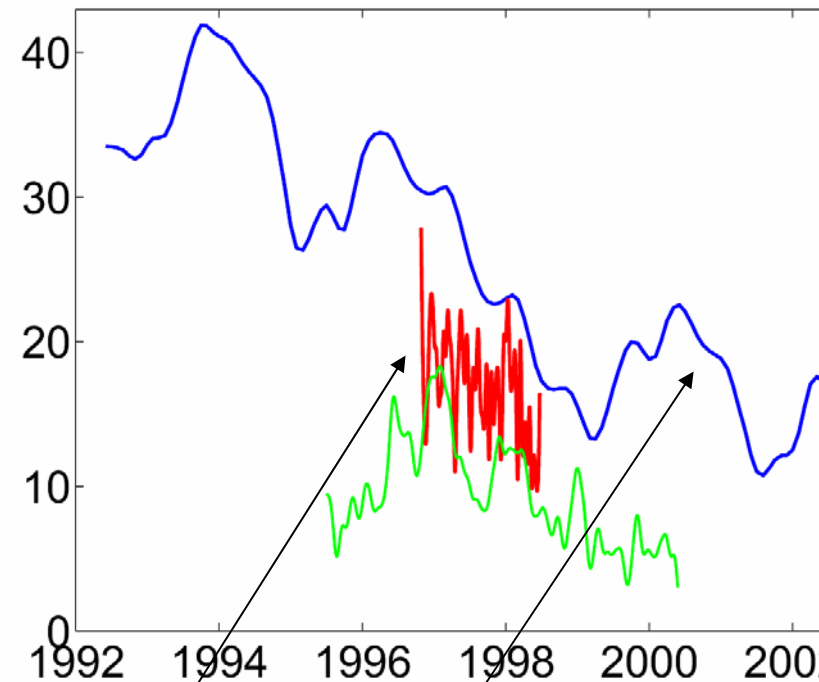
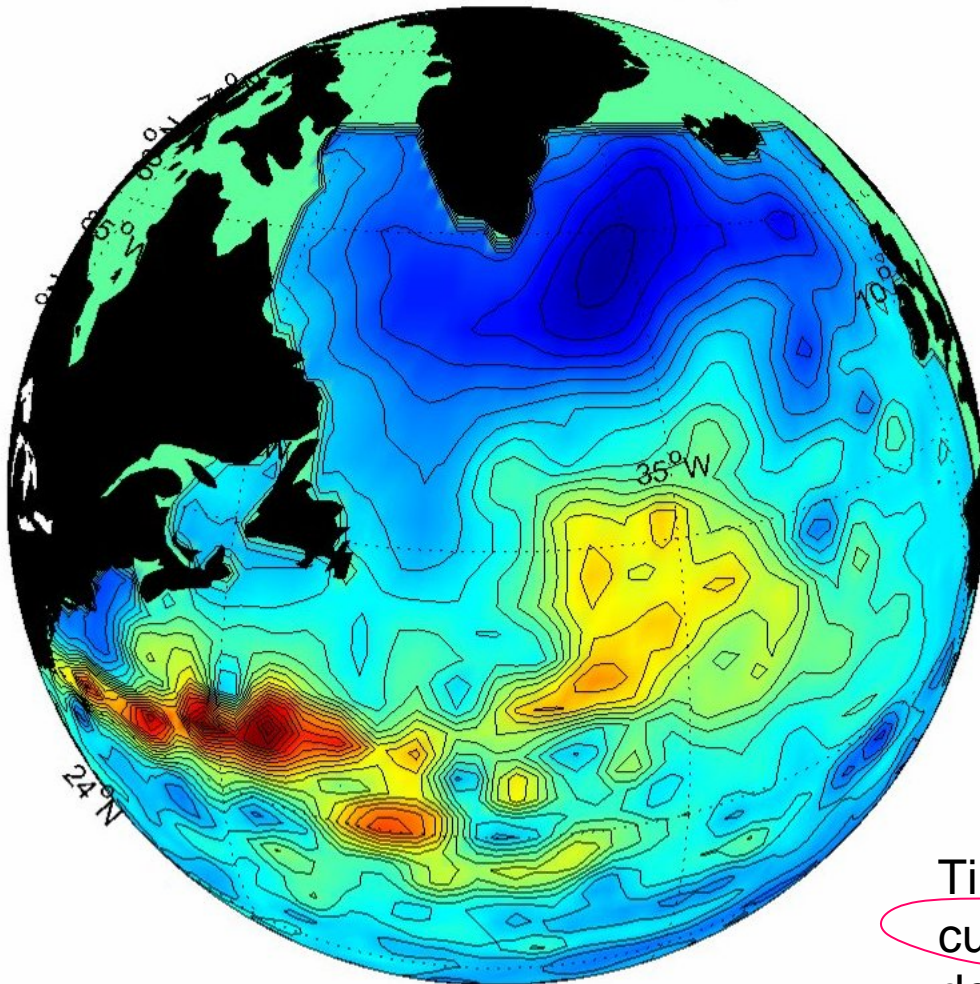
This north-south temperature section, 1000km long across the Labrador Sea gyre shows the high spatial resolution (averaging 3 km) of the Seaglider. 1550 vertical profiles were collected: salinity, temperature, dissolved oxygen, fluorescence and particle scattering



Perspective plot of salinity profiles and temperature (colored) on the glider section from Labrador to Greenland:



The Seaglider program will contribute to the intensive monitoring of ocean climate change in the high-latitudes, such as seen in this principal EOF of the North Atlantic sea-surface height, showing the strong decline of the subpolar gyre circulation since 1994 (from TOPEX/Poseidon altimetry, in situ hydrography and current meter moorings, *Hakkinen and Rhines, Science, 2004*)



Time series of the principal EOF, and currents directly measured at the Labrador deep boundary current